IC5.2: Optional Job Sheet

Diagnosing Mesoscale Internal Forcing—Frontogenesis

Objective: Examine a winter weather event and apply frontogenesis concepts discussed in the IC 5 Lesson 2 training module.

Data: 15 March 2004 winter storm event in the Midwest. You will be using your WES machine in case review mode.

Instructions:
On your WES machine, load the 15 March 2004 case, DMX localization, and set the clock to 15 March 2004, 13:00 UTC. **Focus on the 12 UTC 15 March NAM 80 analysis for each question in this jobsheet, unless otherwise noted.**

Take a vertical cross section perpendicular through the low-level thermal gradient from MN south to MO and load NAM 80 potential temperature, omega, ageostrophic wind vectors, geostrophic wind vectors, NAM 40 2-D frontogenesis, and Div Q.

Question 1. Where would you expect to find a secondary ageostrophic circulation?

Question 2. Is there any sign of such a circulation, and if so, where is it located?

Question 3. What do you think is causing the vertical motion over southern Iowa?

Question 4. Where are the upper- and lower-level circulations coupled? (list a vertical layer and a general geographic location)

In a plan view pane and regional scale, load NAM 80 750mb wind divergence, wind, total deformation and potential temperature.

Question 5. Does this appear to be frontogenetic or frontolytic? (circle one)

Question 6. Where is the convergence maximized?

At any scale of your choosing, load a satellite image over surface obs, lightning, and NAM 40 850mb 2-D frontogenesis.

Question 7. Do you expect any enhanced frontogenesis from diabatic effects?

At the regional scale in a plan view, load NAM 80 500-300mb PV and overlay NAM 40 700mb frontogenesis.

Question 8. Where and at what forecasted time might the PV anomaly strengthen and/or couple with the frontogenesis?

Load a 4 panel plan view of NAM 80 Div-Q from 500-300 mb in all 4 windows, then in each window load NAM 40 2-D Frontogenesis at 4 different heights .

Question 9. At what height are frontogenesis and Div-Q coupled to produce maximum forcing? Where geographically is this coupling located?

An answer key is available for this job sheet. Please see your local AWOC Winter Weather facilitator to obtain a copy.